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The first record of a medicinal plant species *Boerhavia repens* L. (Nyctaginaceae) from Libya

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Abstract
A new record for *Boerhavia repens* L is recorded for the first time in the flora of Libya. This widespread wild weed was collected from the Ariggiba region (110 Km west-south Sabha city). To facilitate further identification and future detection, a full description, habitat information, distribution map, and distribution data are provided. A brief discussion about the most important threats posed by this species is presented.
Keywords: Sabha**,** Ariggiba Region, a new record, taxonomy**,** spiderlings, Alena

Introduction
Boerhavia repens L., Sp. Pl. 1: 3 (1753), (Family: Nyctaginaceae) is a species of African origin, specifically native to Southern Africa and Tropical Africa (Codd, 1966; Chen & Wu, 2007; (Struwig, 2011). The species is distributed across Africa, Asia-Tropical, and Asia-Temperate regions, and has also been introduced to parts of Europe, particularly southeastern Europe. These habitats are characterized by harsh environmental conditions, including limited rainfall, intense sunlight, and well-drained soils, which have influenced the plant's physiological adaptations. The genus *Boerhavia* consists of approximately 40 species, which are primarily distributed in tropical and subtropical regions with warm climates. In Libya, one species of *Boerhavia*, (*B. diffusa*), has been previously reported (Siddiqi & El-Gad, 1980). This study reports a new record of *Boerhavia repens* L. in the

flora of Libya, which will increase the number of Boerhavia species known to occur in the country to two wild species. Additionally, due to the medicinal importance of *B. repens*, it will be registered as a new medicinal plant in Libya. Previous studies have highlighted the various medicinal properties of *B. repens*, including its use as a potent antioxidant (Rahman, 2014; Choo et al., 2022), a diuretic, and in the treatment of conditions such as jaundice, constipation, fever, blood purification, stomach-aches, yaws, gonorrhea, dropsy, asthma, scabies, skin rashes, smallpox, and viral infections (Muzila, 2006). The root of *B. repens* is also known to have purgative properties (Nazneen et al., 2016).

Material and methods

Boerhavia repens L was collected from Ariggiba Region, 110 Km west-south Sabha city about 1000 Km south- Tripoli, (26 58 63.6 N, 13 49 03.4 E), for two consecutive seasons, 2023-2024 (Figure 1). The collected specimens were treated with ordinary herbarium techniques (Pressing, drying, mounting, labeling). After critical investigations, the plant is identified as *Boerhavia repens* L. The voucher specimens were deposited in the herbarium of the Botany Department (ULS), Faculty of Science, University of Sabah using the data from several references (Chen, 2007; Struwig & Siebert, 2013; Choo et al. 2022). The plant species were given voucher number (028022N). The Voucher specimens were deposited in the same herbarium, with a duplicate sent to the herbarium of the Botany Department, Gharyan University, Gharyan, Libya (Figure 1).

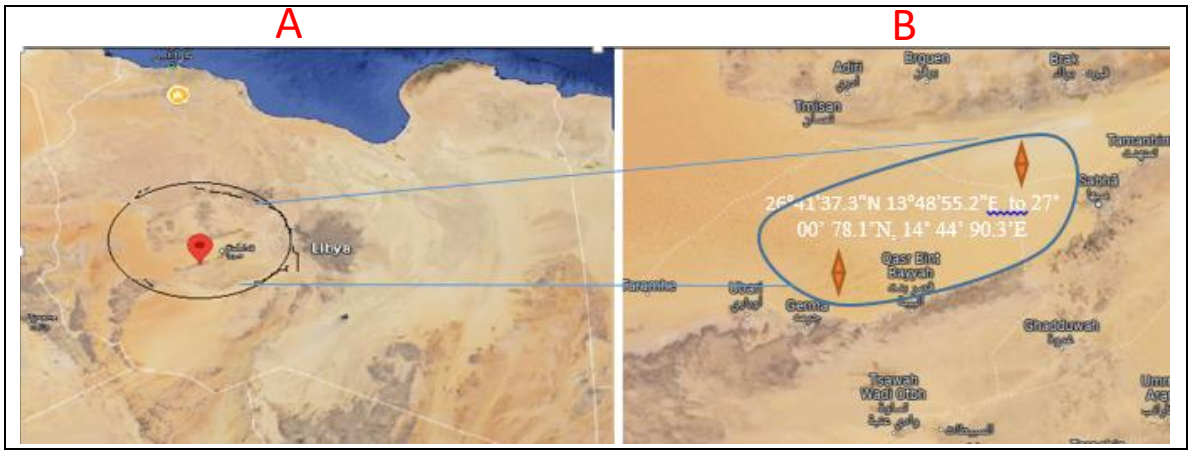


Figure 1. Map of Libya (A) and detailed map of the Sabha district (B) showing the locality where Boerhavia repens was collected & Longitude and latitude Location.

Description of Species

Accepted name: *Boerhavia repens* L., Sp. Pl. 1: 3 (1753) (Table 1).

Etymology and common names: The specific epithet, *repens*, means creeping and refers to its prostrate habit. It is commonly known as 'alena spiderling' or *alena-kleefbossie* (Afrikaans).

English common name: spiderlings and hogweeds

Synonyms: *diffusa gymnocarpa. Boerhavia diffusa L. var. repens (L.) Choisy Boerhavia procumbens Roxb, Boerhavia reptans L* (Chatelain et al., 2006).

Table 1. Scientific Classification of *Boerhavia repens*.

RANK	SCIENTIFIC NAME	COMMON NAME
KINGDOM	*Plantae*	Plants
SUBKINGDOM	*Tracheobionta*	Vascular plants
SUPER DIVISION	*Spermatophyta*	Seed plants
DIVISION	*Magnoliophyta*	Flowering plant
CLASS	*Magnoliopsida*	Dicotyledons
SUB CLASS	*Caryophyllidae*	-
ORDER	*Caryophyllales*	-
FAMILY	*Nyctaginaceae*	Four o'clock family
GENUS	*Boerhavia* L	spiderling
SPECIES	*Boerhavia repens* L.	red spiderling, Alena

(Debasmita et al., 2015).

Boerhavia repens L. is a perennial, prostrate to ascending herb. It has a spreading or creeping growth habit, with slender, often reddish stems reaching up to 1 m in length. The leaves are simple, opposite, and petiolate. The leaf blades are ovate to oblong-ovate in shape, measuring 1-5 cm long and 0.5-3 cm wide. The leaf bases are rounded to cuneate, while the apices are obtuse to rounded (Muley et al., 2023). The inflorescences are terminal or axillary cymes bearing small, pink to purplish-red flowers. The flowers are actinomorphic, with a perianth consisting of a 5-lobed, funnel-shaped calyx-like structure. The stamens are exserted, usually 2-3 in number, and the style is filiform with a capitate stigma. The fruit is a small, club-shaped, ribbed or glandular achene, typically 2-4 mm long. The achenes are enclosed within the persistent perianth, which often has sticky glandular hairs (Chen & Wu, 2007). *Boerhavia repens* is adapted to the harsh environmental conditions of its native habitats, which are characterized by limited rainfall, intense sunlight, and well-drained soils. The plant's prostrate growth habit, succulent leaves, and other physiological adaptations allow it to thrive in these challenging environments (Struwig et al., 2011) (Figure 2).



Figure 2. (A) prostrate growth of *Boerhavia repens* L, (B) Branch of *Boerhavia repens L* with flower (C) portion of Leaf margins finely serrulate with tips ending in a short, tightly incurved hair (D) Close-up of a dried anthocarps (Photos: K.Salem., Design S. El-Ahamir.)

Distribution: The species is widely distributed across Africa, Asia-Tropical, and Asia-Temperate regions and has been introduced to parts of Europe, particularly southeastern Europe.

Habitat: *Boerhavia repens* L does well in a wide range of soil types, from clayey, dry soils to deep alluvial soils with shallow groundwater. It can be semiarid conditions.

Chromosome number: This diploid chromosome number (2n = 26) has been documented in several studies on the cytology and karyotype of *Boerhavia repens* (Kaur & Gill, 1985; Sinha, 1954; Chopra, 1969; Siddiqi & El-Gadi, 1980).

Voucher specimen: Specimens examined- colonies of this plant near dried water bodies and wastelands of (Ariggiba region 26 58 63.6 N, 13 49 03.4 E) located approximately 110 km west-south of Sabha region of Libya, about 1000 km south of Tripoli, the plant has been detected in 11 locations on (coordinates 26 41 37.3 N 13 48 55.2 E to 27 00 78.1 N, 14 44 90.3 E. (Figure 3).

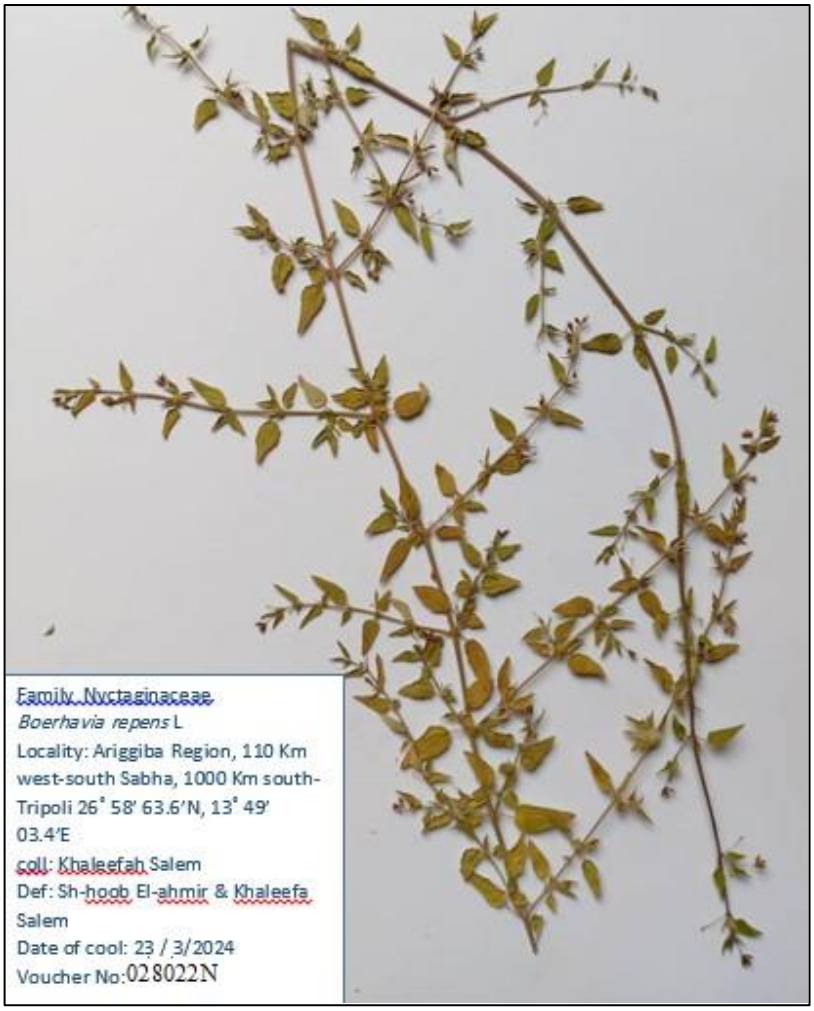


Figure 3. Herbarium specimen of *Boerhavia repens*. collected from Ariggiba region

Results

The native distribution of *Boerhavia repens* was concentrated in two main regions: tropical Africa and southern Africa (Chen & Wu, 2007). In southern Africa, the species is reported to occur throughout Botswana, Namibia, and the arid parts of the Northern Cape and Limpopo provinces in South Africa (Klopper et al., 2006). In tropical Africa, the species is documented in countries such as Egypt, Zimbabwe, and Mozambique (Klopper et al., 2006). Beyond its native African range, *B. repens* has been introduced and established in several other parts of the world, including India, Sri Lanka, Myanmar, Thailand, Malaysia, Indonesia, China, Japan, and southeastern Europe, particularly in Greece, Italy, and Spain. This introduction and establishment outside of the native range is believed to have occurred

through human-mediated dispersal, such as through trade, travel, and cultivation (Chen & Wu, 2007). The current study reports the first record of *B. repens* in the flora of Libya. The species has been observed to be widespread in the Ariggiba Region, located approximately 110 km west-southwest of Sabha city, at coordinates 26 58 63.6 N, 13 49 03.4 E (Figure 1). This finding is significant, as *B. repens* was not previously documented in the flora of Libya compiled by Jafri (1989) and Keith (1965), indicating that this represents a new addition to the plant species diversity of the country.

Key to the genus *Boerhavia* in Libya

Since the Flora of Libya contains one species of the genus *Boerhavia*, this research added the second plant, it is necessary to reformulate the classification key for the species of *Boerhavia* to distinguish the two species.

1 (a) Anthocarp Obovoid, apex rounded when fresh but shortly umbonate when dry……...….2 (a)

(b) Anthocarp ellipsoid, apex rounded to acute……..……2 (b)

2 (a) Leaf margins entire and pubescent with multicellular glandular hairs 0.3–0.5 mm long…….……...3 (a)

(b) Leaf margins finely serrulate with purplish tips ending in a short, tightly incurved hair, sometimes sparsely interspersed with 0.1–0.2 mm long, slightly strigose……..…..3 (b)

3 (a) Inflorescences mainly terminal panicles, very rarely axillary in immature plants with only 1 or 2 anthocarps; upper part of perianth crimson to magenta; anthers and stigma crimson to magenta; anthocarps c. 4 × 1.5–1.6 mm when mature, with glands mostly on the ridges, furrows sparsely glandular and dotted with small narrowly conical papillae ..... *B. diffusa*

(b) inflorescences generally axillary but can also be terminal towards the distal ends of the stem; upper part of perianth pink to pale purple; anthers yellow, stigma pale purple; anthocarps 2.9–3.5 × 1–1.3 mm …….. *B. repens*

Discussion

The results of this study demonstrate the broad global distribution of *Boerhavia repens*, which extends well beyond its native range in Africa. The species has shown a remarkable ability to adapt and thrive in a variety of tropical, subtropical, and warm temperate regions around the world, likely facilitated by its adaptability and tolerance to diverse environmental conditions. The expansion of *B. repens* into non-native regions raises some potential conservation concerns. In areas where the species has been introduced, it has the potential to become invasive, potentially outcompeting and displacing native plant communities, thus impacting local biodiversity and ecosystem functioning (Muzila, 2006). Additionally, the use of *B. repens* as a medicinal plant in some regions has led to concerns about unsustainable harvesting of wild populations, which could threaten the long-term viability of local populations. A multifaceted management approach may be warranted to address these concerns. This may include monitoring and early detection of *B. repens* in non-native regions, targeted control measures such as manual removal or selective herbicide application, promoting sustainable harvesting practices for medicinal use, and ecological restoration efforts to rehabilitate affected ecosystems. Regulatory measures, such as quarantine or restricted-species lists, may also be necessary in certain contexts to prevent further introduction and spread of the species (Muzila, 2006). Implementing these strategies can mitigate the potential negative impacts of the global expansion of *Boerhavia repens* and maintain the delicate balance of local ecosystems. In conclusion, this study has documented the expanding global distribution of *Boerhavia repens,* a plant species native to parts of Africa. The findings demonstrate the species' ability to naturalize and establish populations beyond its native range, including the first record of its presence in the flora of Libya. While *B. repens* has several reported medicinal uses, its introduction and spread in non-native regions can threaten local ecosystems and biodiversity. Proactive management strategies, including monitoring, control measures, and sustainable harvesting practices, may be necessary to mitigate the potential negative impacts associated with the further expansion of this plant species. Continued research and vigilance will be critical to understanding and managing the widespread distribution of *B. repens* globally.

References

Chatelain, C., Bänninger, V., Habashi, C., Gautier, L., & Spichiger, R. (2006). Checklist of the flowering plants of sub-Saharan Africa: An index of accepted names and synonyms.

Chen, S. H., & Wu, M. J. (2007). A taxonomical study of the genus Boerhavia (Nyctaginaceae) in Taiwan. Taiwania, 52(4), 332-342.

Choo, L. M., Chen, L. M. J., & Turner, I. M. (2022). Flora of Singapore precursors, 31: The genus Boerhavia (Nyctaginaceae) in Singapore and clarification of Boerhavia diffusa in Singapore and Peninsular Malaysia. Gardens Bulletin Singapore, 74(1).

Chopra, R. N. (1969). Chromosome numbers in Indian medicinal plants. Indian Journal of Genetics and Plant Breeding, 29(2), 303-322.

Codd, L. E. (1966). Notes on Boerhavia in southern Africa. Bothalia, 9(1), 113-121.

Debasmita, D. P., Maiti, G. G., & Mondal, M. S. (2015). A taxonomic revision of the genus Boerhavia L. (Nyctaginaceae) in India. Journal of Global Biosciences, 4(3), 1704-1717.

Jafri, S. M., & El-Gadi, A. A. (1976-1989). Flora of Libya. AlFaateh University, Faculty of Sciences, Tripoli, Libya: Department of Botany.

Kaur, R., & Gill, B. S. (1985). Cytological studies on some members of the family Nyctaginaceae. Cytologia, 50(3), 461-471.

Keith, H. G. (1965). A preliminary checklist to the Libya flora (2 vols.). Ministry of Agriculture, Libya.

Klopper, R. R., Chatelain, C., Habashi, C., Gautier, L., & Spichiger, R. E. (2006). Checklist of the flowering plants of Sub-Saharan Africa: An index of accepted names and synonyms. Sabonet.

Muley, M. M., Doshi, S. M., Goyal, A., & Jachak, S. M. (2023). Ethnopharmacology and phytochemistry of selected species of Boerhavia occurring in India: A review. Current Traditional Medicine, 9(2), 93-113.

Muzila, M. (2006). Boerhavia diffusa L. Prota, 11(1).

Nazneen, F., Sheikh, M. A., & Jameel, A. (2016). Phytochemical screening, antiglycation, and antioxidant activities of the whole plant of Boerhavia repens L. from Cholistan, Pakistan. Pakistan Journal of Pharmaceutical Sciences, 29.

Rahman, S. M., Alam, M. M., Amin, M. R., Fakruddin, M., Shahid-ud-Daula, A. F. M., & Siddiqui, R. (2014). Antimicrobial activity and brine shrimp toxicity of methanolic whole plant extract of Boerhavia repens L. (Family: Nyctaginaceae). International Journal of Phytopharmacology, 4(6), 135-139.

Siddiqi, M. A., & El-Gadi, A. (1980). Chromosome numbers of some Libyan plants. Cytologia, 45(2), 311-321.

Sinha, S. (1954). Cytological studies in the family Nyctaginaceae. Cytologia, 19(4), 245-261.

Struwig, M. (2011). A systematic study of Boerhavia L. and Commicarpus Standl. (Nyctaginaceae) in southern Africa (Doctoral dissertation).

Struwig, M., & Siebert, S. J. (2013). A taxonomic revision of Boerhavia (Nyctaginaceae) in southern Africa. South African Journal of Botany, 86, 116-134.

Struwig, M., Jordaan, A., & Siebert, S. J. (2011). Anatomy of the southern African Boerhavia and Commicarpus species (Nyctaginaceae). Bangladesh Journal of Plant Taxonomy, 18(2), 105.